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Information Search Patterns on Product Comparison Services in E-Commerce Websites

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ABSTRACT

It is important for firms to help customers find the products or information they need in order to increase sales and promote return visits to their websites. Hence, the presentation of product information is very important in e-commerce websites. In this research, we study how disposition styles can influence browsing patterns. The pilot test results show that people are inclined to use feature information paths in the vertical disposition style and product information paths in the horizontal disposition style. With vertical disposition, users are more likely to follow feature information paths which may help them focus on comparisons across products.

Keywords

Product comparison, information paths, search patterns, e-commerce.

INTRODUCTION

The market share of e-commerce has increased dramatically over the last few years, signifying its increased importance and popularity. Most of the major U.S. retail stores have established a brick-and-click business strategy to enhance their competitive advantage. Wal-Mart, JCPenney, and Sears are some examples. The value and popularity of e-commerce is derived from the opportunity to compare a wide variety of alternative products at the customers' convenience. It is important for firms to help customers find the products or information they need in order to increase sales and promote return visits to their websites (Tarasewich and Fillion 2004). Hence, the presentation of product information is very important in e-commerce websites. Firms maintain and modify their websites on a continual basis to provide better presentations of information and interface to their customers. One strategy to enhance sales in e-commerce is to implement an effective presentation format for comparing products on websites (Lohse and Spiller, 1998).

E-commerce websites usually present their products in two different styles: vertical disposition (see Figure 1) and horizontal disposition (see Figure 2). Are users' browsing patterns influenced by disposition styles? This research will provide answers to the question. The objective of this research is to study the effects of horizontal and vertical disposition styles on human information search patterns in the e-commerce context.

LITERATURE REVIEW

Using visual search theory, central capacity theory, and the associative network model, Hong et al. (2004) found that specific "presentation formats" support specific types of user perceptions in e-commerce. They concluded that a list-format display worked well for "browsing" an e-commerce site, while a matrix-format display worked well for "searching" on an e-commerce site.

Zhang and Massad (2003) found that the placement of animation (as non-primary information) has a significant effect on task performance – i.e., placing the animation "on the left side has a higher negative impact than on the right side." Arnheim (1969) noted that in non-text displays, the center will be dominant; and that if a number of images are shown, factors such as symmetry will displace the center.




	Product 1	Product 2	...	Product N
Image			...	
Feature 1 (Ex. Name)	Milk 1	Milk 2	...	Milk N
Feature 2 (Ex. Price)	3.44	2.49	...	4.25
...
Feature N (Ex. Status)	In Stock	In Stock	...	In Stock

Figure 1. Vertical Disposition Style in Product Comparison




	Image	Feature 1 (Ex. Name)	Feature 2 (Ex. Price)	...	Feature N (Ex. Status)
Product 1		Milk 1	3.44	...	In Stock
Product 2		Milk 2	2.49	...	In Stock
...
Product N		Milk N	4.25	...	In Stock

Figure 2. Horizontal Disposition Style in Product Comparison

Hong et al. (2004) suggested that “processing information about an item depends not only on the attention it attracts per se, but also on the attention that other items on the same screen attract.” It is widely recognized that human capacity for information processing is limited. Payne et al. (1993) indicated that people have a tendency to ignore items or conditions they are not interested in and that presentation formats can also affect such behavior.

THEORETICAL BACKGROUND

An e-commerce website should be designed in such a way that customers can easily and effectively gather relevant information about products to help them assess which products meet their needs.

Chang et al. (2001) identified eleven laws of Gestalt Theory which have significant implications for visual screen design. We identify three laws of Gestalt that play an important role in influencing customers’ search paths on e-commerce websites.

- l Law of focus point: every visual presentation has a focal point, which is called the center of interest or point of emphasis. This focus point catches the viewer's attention and serves as an anchor on the viewer's search path.
- l Law of proximity: viewers mentally organize closer elements into a coherent object group, because they assume that closely spaced elements are related.
- l Law of simplicity: when a learner sees a visual object, he/she will unconsciously simplify the perceived object into what the viewer can easily understand.

Based on the law of focus point, we argue that customers will look for an important point to begin their search on a website. With the law of proximity, we argue that when customers search for product information, they tend to group closely spaced contents and compare contents that are perceived to be in close proximity. Such comparisons influence their product search patterns on e-commerce websites. Since the norm for website design is based on the line-by-line format, customers are likely to be accustomed to viewing and reading line-by-line and hence, are more likely to compare and relate contents horizontally. With the law of simplicity, customers may focus on their desired information and ignore other information to simplify their search processes. To simplify information search, customers may focus either on the features of a specific product or on a specific feature of a set/group of products at any one time. Such attention focus influences their browsing patterns on e-commerce websites. Thus, customers' search behaviors on e-commerce websites can be explained and are influenced by these three laws of Gestalt.

THEORETICAL HYPOTHESES ON INFORMATION SEARCH PATHS

We propose that customers' information search paths will be influenced by disposition styles when searching for products on e-commerce websites.

Customers' search patterns refer to their patterns of visual attention on information. In this research, a customer's visual attention from one target to another is referred to as an information search path. There are two kinds of information search paths in this research: feature and product information search paths. If a customer moves his/her attention from one target to another within the same feature (of different products), the customer follows the feature information path. Hence, in the context of vertical disposition style, feature information path refers to the horizontal movement of visual attention whereas in the context of horizontal disposition style, feature information path refers to the vertical movement of visual attention on information. If a customer moves his/her attention from one target to another between features of the same product, the customer follows the product information path. In this research, we hypothesize that disposition styles affect customers' information search patterns.

In vertical disposition style, information about the same feature of multiple products is listed side by side on the same row which is consistent with people's viewing patterns on websites. Hence, we hypothesize that:

H1: Users who are given a vertical disposition style will follow the feature information paths more than users who are given a horizontal disposition style.

In horizontal disposition style, the information search pattern is more product-based since users are accustomed to viewing information on the same row where features of a product are displayed. Therefore, we hypothesize that:

H2: Users who are given a horizontal disposition style will follow the product information paths more than users who are given a vertical disposition style.

RESEARCH METHODOLOGY

A within-subject experimental design is proposed to test the two hypotheses. Each subject will experience both vertical and horizontal disposition styles, thus serving as their own control. The order of the disposition styles will be randomized among the subjects. The subjects will be asked to search for a product that he/she would like to purchase on a simulated e-commerce website. In order to motivate the subjects to search for their most highly preferred product in each of the two rounds/conditions (i.e., vertical and horizontal disposition styles), we will provide incentives to them by drawing one grand prize where the winner will be given one of the two products he/she has selected in the experiment.

To control for the (randomized) positioning of products, a randomization procedure is used. For each experimental session, the total set of products (i.e., 10 products) is randomly divided into two disposition styles (i.e., 5 products are randomly selected out of 10 for each disposition style) and displayed in a completely randomized order in the product comparison tables (see Figure 3) of the two disposition styles. In this way, the placement of products is completely randomized for each subject.

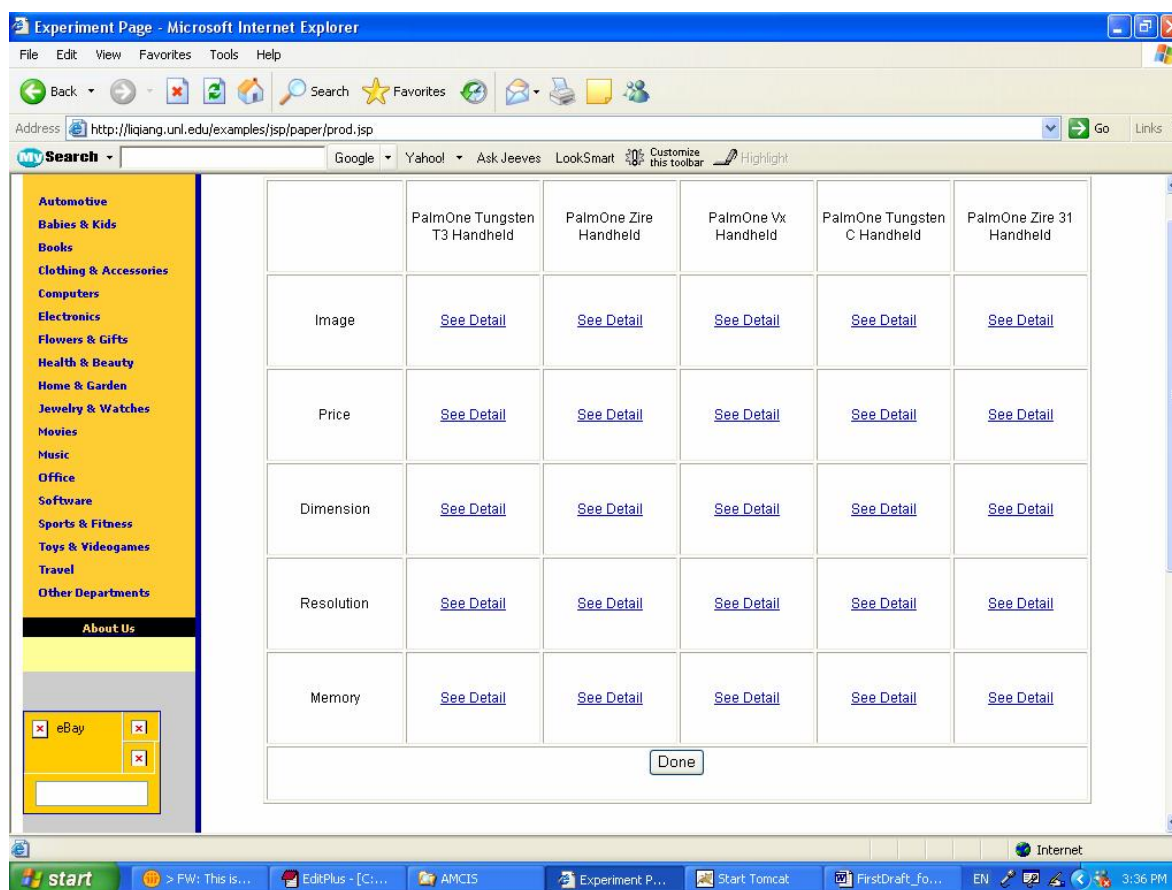


Figure 3. Screen Shot for Vertical Disposition

For this experiment, the visual attention of each subject will be tracked using computer logs of click patterns (Todd and Benbasat, 1987). Every cell in the product comparison table specifies information about a feature of a product. At the beginning of the experiment, the information in all the cells will be hidden. To view the information in a cell, the subject will have to click on the cell to have the information displayed. When the subject clicks on another cell, the information on previously clicked cells will be closed or hidden again. This is done to track which information is being attended to by the subject throughout the search process in order to derive the complete information search paths. For example, if a subject clicks on the cell for price of product A, then clicks on the cell for price of product B, and then clicks on the cell for image of product B, the first movement is a feature information path (i.e., comparing or looking up a feature of two products) and the second movement is a product information path (i.e., looking up features of a product). A subject can click on any cell as many times as he/she needs until he/she decides on the product to purchase. Upon completion of the task (i.e., the product to purchase has been determined), the subject will be asked to click on the “Done” button at the bottom of the screen (see Figure 3) and to specify the product chosen.

PILOT TEST AND PRELIMINARY RESULTS

A pilot test was conducted. Twenty two subjects took part in the pilot study. Ten PDA products were chosen for the pilot study. Table 1 shows the descriptive statistics of the data. The Wilcoxon test (Siegel and Castellan, 1988) was used for the analysis and the results are shown in Table 2. The results indicate that both H1 and H2 are supported ($p < .05$).

Information Path	Disposition Style	# of Subjects	Mean of # of Information Paths	Std. Deviation
Product	Vertical	22	5.55	5.74
	Horizontal	22	8.14	7.53
Feature	Vertical	22	18.23	13.52
	Horizontal	22	13.18	8.45

Table 1. Descriptive Statistics of Pilot Test

	(# of Feature I. P. in Horizontal) – (# of Feature I. P. in Vertical)	(# of Product I. P. in Horizontal) – (# of Product I. P. in Vertical)
Z	-2.080	1.683
Sig.	.019	.046

Table 2. Wilcoxon Signed Ranks Test for H1 and H2

CONCLUSION AND FUTURE RESEARCH

In this research, we study how disposition styles can influence browsing patterns. The pilot test results show that people use feature information paths more than product information paths in the vertical disposition style whereas product information paths are used more frequently than feature information paths in the horizontal disposition style. With vertical disposition, users are more likely to follow feature information paths which may help them focus on comparing features across products – a primary purpose of product comparison services.

In future research, we will also examine users' decision making processes. People undergo several steps to make a decision. Tybout et al. (1981) used information processing theory to describe how people make decisions, and they maintain that there are three stages in a decision-making process. Payne et al. (1993) argued that decision makers have a tendency to ignore items or conditions they are not interested in (i.e., elimination), and after identifying a small number of possible options or favorites they would carry out a tradeoff analysis among a small number of products. Future research will examine the different decision making stages and their fit with horizontal and vertical disposition styles.

Tarasewich and Fillion (2004) outlined the strengths and weaknesses of existing eye-tracking and process-tracing methods. In this research, we adopted the clicking method highlighted by Todd and Benbasat (1987). In future research, we are interested to use multiple process-tracing methods, including the Restricted Focus Viewer (RFV) recommended by Tarasewich and Fillion (2004), to triangulate the results.

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